CLAIMS

1. A drying apparatus for drying a subject, wherein a refrigerant is circulated through a compressor, a radiator, an expansion mechanism and an evaporator through pipes, said drying apparatus comprising:

a drying air flow path operable to introduce drying air heated by the radiator to the subject to be dried, dehumidify the drying air which has been introduced to the subject by using the evaporator, and, heat the dehumidified drying air to return it into the drying air; and

a bypass circuit through which a portion of the drying air heated by the radiator flows to the evaporator without coming into contact with the subject to be dried.

2. A drying apparatus according to claim 1, further comprising a bypass circuit flow rate detecting device operable to detect a flow rate of the drying air which flows into said bypass circuit; and

a bypass air flow rate adjusting device operable to adjust the flow rate of the drying air flowing into said bypass circuit using a value detected by said bypass circuit flow rate detecting device.

3. A drying apparatus according to claim 1, further comprising a super heat detecting device operable to detect super heat which is a difference between a refrigerant suction temperature of the compressor and a refrigerant evaporation temperature of the evaporator; and

a bypass air flow rate adjusting device operable to adjust a flow rate of drying air flowing into said bypass circuit using a value detected by said super heat detecting device.

4. A drying apparatus according to claim 1, wherein the drying air flowing through said bypass circuit heat-exchanges with a portion of the pipes which is located between the compressor and the evaporator.

5. A drying apparatus according to claim 1, further comprising a temperature detecting device operable to detect a temperature of the drying air dehumidified by the evaporator; and

a bypass air flow rate adjusting device operable to adjust a flow rate of the drying air flowing into said bypass circuit using a value detected by said temperature detecting device.

6. A drying apparatus according to claim 1, wherein in relation to a point at which the drying air passing through said

bypass circuit meets the drying air passing through the subject to be dried, the drying air passing through said bypass circuit reaches the meeting point from a position located below the meeting point in a direction of gravity of the drying air passing through the subject to be dried.

7. A drying apparatus according to claim 1, wherein said drying air flow path is provided with a refrigerant accommodating container operable to accommodate a refrigerant.

8. A drying apparatus according to claim 7, wherein said refrigerant accommodating container is disposed in said drying air flow path at a location between a downstream portion of the radiator and an upstream portion of the evaporator.

9. A drying apparatus according to claim 1, wherein the compressor, radiator, and expansion mechanism are operated in a state in which a high pressure side thereof is in a supercritical state.

10. A heat pump type drying apparatus comprising:

a heat pump having a compressor, a radiator, an expansion mechanism and an evaporator connected via pipes through which a refrigerant is circulated;

a drying air flow path operable to introduce drying air heated by said radiator to a subject to be dried, dehumidify the drying air which has been introduced to the subject by using said evaporator, and heat the dehumidified drying air to return it into the drying air; and

a bypass circuit through which a portion of the drying air heated by said radiator flows to said evaporator without coming into contact with the subject to be dried.

11. A heat pump type drying apparatus according to claim 10, further comprising:

a bypass circuit flow rate detecting device operable to detect a flow rate of the drying air which flows into said bypass circuit; and

a bypass air flow rate adjusting device operable to adjust the flow rate of the drying air flowing into said bypass circuit using a value detected by said bypass circuit flow rate detecting device.

12. A heat pump type drying apparatus according to claim 10, further comprising:

a super heat detecting device operable to detect super heat which is a difference between a refrigerant suction temperature of said compressor and a refrigerant evaporation temperature

of said evaporator; and

a bypass air flow rate adjusting device operable to adjust a flow rate of drying air flowing into said bypass circuit using a value detected by said super heat detecting device.

13. A heat pump type drying apparatus according to claim 10, wherein the drying air flowing through said bypass circuit heat-exchanges with a portion of said pipes which is located between said compressor and said evaporator.

14. A heat pump type drying apparatus according to claim 10, further comprising a temperature detecting device operable to detect a temperature of the drying air dehumidified by said evaporator; and

a bypass air flow rate adjusting device operable to adjust a flow rate of the drying air flowing into said bypass circuit using a value detected by said temperature detecting device.

15. A heat pump type drying apparatus according to claim 10, wherein in relation to a point at which the drying air passing through said bypass circuit meets the drying air passing through the subject to be dried, the drying air passing through said bypass circuit reaches the meeting point from a position located below the meeting point in a direction of gravity of the drying

air passing through the subject to be dried.

16. A heat pump type drying apparatus according to claim 10, wherein said heat pump type drying apparatus further comprises: a refrigerant accommodating container disposed in the drying air flow path to accommodate a refrigerant.

17. A heat pump type drying apparatus according to claim 16, wherein said refrigerant accommodating container is disposed in said drying air flow path at a location between a downstream portion of said radiator and an upstream portion of said evaporator.

18. A heat pump type drying apparatus according to claim 10, wherein said heat pump is operated in a state in which a high pressure side thereof is in a supercritical state.

19. A drying method for drying a subject located within a circuit, said drying method comprising:

dehumidifying and heating air to obtain drying air having a high temperature and low moisture;

passing a portion of the drying air through the circuit to bring the portion of the drying air into contact with the subject;

passing another portion of the drying air through a bypass circuit, the bypass circuit being arranged to avoid the another portion of the drying air from coming into contact with the subject; and

mixing the portion of the drying air brought into contact with the subject and the another portion of the air passed through the bypass circuit to obtain the air.

20. A drying method as claimed in claim 19, further comprising adjusting a flow rate of the drying air which is passed through the bypass circuit.

21. A drying method as claimed in claim 20, further comprising detecting a temperature of the air after it is dehumidified and controlling said adjusting the flow rate of the drying air which is passed through the bypass circuit by using the detected temperature.